

REMARKS/ARGUMENTS

In a Final Office Action dated July 7, 2009 (hereinafter "Office Action"):

- Claims 35-41 and 44-49 were rejected under 35 U.S.C. § 102(b) as allegedly anticipated by DeKoning (U.S. Pat. No. 5,974,502).
- Claims 12-18 and 29-34 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over DeKoning in view of Raman (U.S. Pub. Pat. App. No. 2003/0217119).
- Claims 19 and 20 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over DeKoning in view of Raman and further in view of Ibrahim (U.S. Pat. No. 6,880,062).
- Claims 42 and 43 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over DeKoning in view of Ibrahim.
- Claims 76-82, 92-98, 101-103, 105, 107-109, 111, 113-115 and 117 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over DeKoning in view of Brewer (U.S. Pub. Pat. App. No. 2003/0002503).
- Claims 83 and 99-100 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over DeKoning in view of Brewer and further in view of Ibrahim.
- Claims 104, 106, 110, 112, 116 and 118 were rejected under 35 U.S.C. § 103(a) as allegedly obvious over DeKoning in view of Brewer and further in view of Raman.

Claims 12-20, 29-34 and 76-118 have been cancelled, and new claims 119-142 added.

Applicants respectfully submit that in view of the arguments presented herein, all claims are allowable.

I. The Examiner Interview of September 1, 2009

Applicants thank the Examiner for the telephonic interview requested by Applicants and conducted on September 1, 2009. During the interview, claims 35 and 39 were discussed, as was the DeKoning reference. Although no agreement with respect to the claims was reached, the Examiner requested that the discussion of the claims and the DeKoning reference be included in the present response for further consideration. The requested information is presented below.

II. The DeKoning Reference

DeKoning is directed to systems and methods for receiving and processing I/O transfer requests from a host device. Such requests are either forwarded to storage devices within a RAID system, or divided into one or more smaller requests that are each sent to the storage devices. More specifically, and referring to FIG. 3 of DeKoning (reproduced below), write I/O requests received from host computer 42 are separated, processed and distributed to the array of disk drives 46 by disk array controller 44 according to the RAID level of the array.¹ The request size calculation unit (RSCU) 54 of disk array controller 44 receives an I/O request and the RSCU 54 calculates the amount of data that needs to be transferred between the host and the array 46.² Comparator 56 receives the calculated amount (i.e., the size of the requested transfer) from

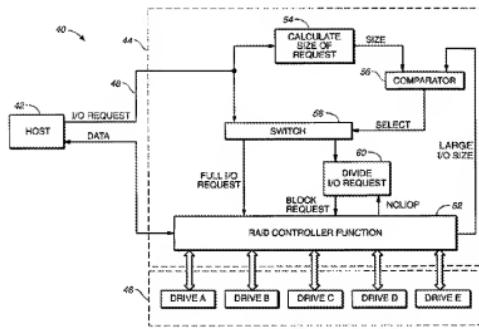


FIG._3

RSCU 54 and compares it against the LARGE I/O SIZE parameter, which is the largest single I/O request processed by the RAID controller function unit (RCFU) 52.³ The LARGE I/O SIZE parameter is either retrieved from memory⁴ or calculated⁵ by microprocessor 62 of RCFU 52,⁶ after which the read or updated parameter is transferred to, and

used by, comparator 56⁷ as described above. If comparator 56 determines that the requested transfer size is less than or equal to the LARGE I/O SIZE parameter, the I/O request is simply forwarded to RCFU 52 for processing.⁸ If the requested transfer size is greater than the LARGE

¹ See DeKoning, col. 6, lines 13-17.

² See DeKoning, col. 6, lines 28-32.

³ See DeKoning, col. 6, lines 32-39.

⁴ See DeKoning, col. 7, lines 62-65.

⁵ See DeKoning, col. 8, lines 26-33.

⁶ See DeKoning, FIG. 4.

⁷ See DeKoning, col. 7-1.

⁸ See DeKoning, col. 6, lines 46-48.

See DeKromming, vol. 6, lines 46-48.

I/O SIZE parameter, the I/O request is transferred to request division unit (RDU) 60, which divides the I/O request into multiple requests that are equal or smaller in size than the LARGE I/O SIZE parameter.⁹

Applicants note that the LARGE I/O SIZE parameter is described by DeKoning as being either a statically tunable value based on system variables such as host channel speed and drive channel speed,¹⁰ or a dynamically tunable value based on feedback variables such as measured or estimated incoming I/O rate, I/O rate from the disk array, XOR processing rate, cache full percentage and controller overhead.¹¹ Nowhere within DeKoning, however, is there any indication that the LARGE I/O SIZE value is in any way based on, or indicative of, whether the disk drives of the array taught by DeKoning can satisfy a particular I/O request at the time the write request is processed. Applicants thus respectfully submit that because the LARGE I/O SIZE is not indicative of the amount of data that the drives can accept, the decision of whether to subdivide the request is made *regardless* of the drives' ability to satisfy the transfer of the amount of data requested.

Applicants further note that the subdivision taught by DeKoning is performed one time at most by RDU 60. This is because the original request is divided "into a plurality of block requests which are *each* equal to or smaller in size than the LARGE I/O SIZE parameter."¹² Once the request is subdivided, there is no need for RDU 60 to subdivide the block requests further as each subdivided request is guaranteed to be for an amount of data equal to or smaller than the LARGE I/O SIZE parameter. The only subsequent subdivision of the requests is that performed by RCFU 52 to implement the distribution of data required by the RAID configuration.¹³ As with the subdivision performed by RDU 60, the subdivision performed by RCFU 52 is also not based on whether the targets can satisfy the amount of a data request. Instead, this secondary splitting is based on the RAID type.

⁹ See DeKoning, col. 6, lines 48-53.

¹⁰ See DeKoning, col. 7, lines 52-57.

¹¹ See DeKoning, col. 8, lines 14-16 and 23-26.

¹² DeKoning, col. 6, lines 51-53 (emphasis added).

¹³ See DeKoning, col. 7, lines 18-20 ("All of these operations will be performed in accordance with the RAID level which is being implemented in the controller.").

III. The Claims

a. The Independent claims

Each of independent claims 35 and 44 requires first a transmission of a write request for multiple blocks of data to multiple targets and then the transmission of a write request for a subset of the multiple blocks of data to the multiple targets if the multiple targets do not satisfy the amount of data to be transferred in the multiple blocks of data. FIGS. 3, 5 and 6 (reproduced below) show part of an example method that illustrates at least one embodiment of this claim requirement.¹⁴ When an initiator sends a write command to the mirroring device (310), the mirroring device sends a write request to multiple target storage devices (320) and waits for a response from each target (330). If the responses indicate that the targets can't accommodate the requested data transfer (340), the write request is aborted (350) and the mirroring device issues another write request to the target storage devices for a subset of the amount of data to be transferred by the multiple blocks (520). Thus, the transmission of the write request for the subset of data is performed if it is determined that the *targets* cannot each satisfy the transfer of the full amount of data.

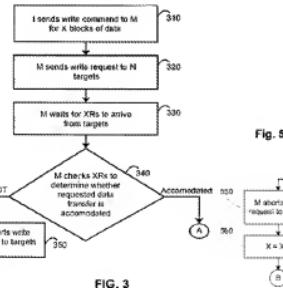


Fig. 3

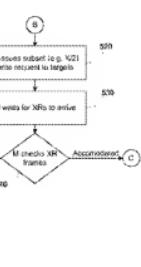


Fig. 5

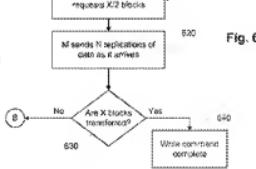


Fig. 6

b. The Dependent claims

Whereas the independent claims require sending a write request for a subset of the of the multiple blocks, dependent claims 39 and 48 each requires sending a write request for a *further*

¹⁴ See also the more detailed text of paragraphs [0034] through [0039] of the published application.

subset of the blocks of previous write requests. Such a previous write request may be either that of the independent claims (e.g., the write request of block 520 of FIG. 5 after a transition from block 350 of FIG. 3), or a prior request of the dependent claims (e.g., the write request of block 520 after a transition from block 560). These dependent claims thus encompass iteratively sending write requests of decreasing size as long as the targets do not satisfy the amount to be transferred by a previous request.

IV. The Rejections

a. The § 102(b) Rejections of Independent Claims 35 and 44

In rejecting independent claims 35 and 44 as allegedly anticipated by DeKoning, and in response to Applicants' prior arguments, it was stated in the Office Action that

DeKoning discloses a response to a write request [DeKoning, at least column 6, lines 28-54] and when the response that the limit is less [than] the write request amount of data, a new request is created and sent [DeKoning, at least column 6, lines 28-54]. The request is sent out to the multiple devices that the data will be mirrored on, a response is sent back that allows the amount of data request to be written or determines that there is a limit on the amount of data that can be sent at once and provides that limit back to the requestor [DeKoning, at least column 6, lines 28-54].¹⁵

Applicants respectfully traverse the rejections and the characterization of the cited art, noting that as explained above, the LARGE I/O SIZE parameter that is used by DeKoning to limit the size of an I/O request is a parameter that is either read from memory or calculated by a CPU within a disk array controller. This limit is not part of any kind of a response sent back from the disk drives, does not reflect whether any of the drives can satisfy a particular amount of data to be transferred to the drives, and is applied regardless of whether the drives can satisfy the requested transfer. DeKoning thus does not teach or even suggest either sending the initial write request for the full set of the multiple blocks of data or conditioning a transmission of a subset write request on whether the target drives can satisfy the amount of data to be transferred in the initial write request, as required by claims 35 and 44. For at least these reasons, Applicants respectfully

¹⁵ Office Action, ¶ 11, p. 14.

submit that independent claims 35 and 44 are not anticipated by DeKoning, and are thus allowable.

b. The § 102(b) Dependent Claim Rejections

Dependent claims 36-41 and 45-49 were also rejected as allegedly anticipated by DeKoning. Because these claims include the limitations of the independent claims upon which they respectively depend, Applicants also respectfully traverse these rejections and respectfully submit that these dependent claims are also allowable for at least the same reasons presented above with respect to independent claims 35 and 44.

With respect to the rejections of dependent claims 39 and 48, Applicants further note that as previously explained the subdivision of the write request from the host is only performed once. Further, the secondary splitting of write requests that is taught by DeKoning operates to implement the RAID functionality and is based on the RAID configuration, not on multiple targets not being able to satisfy the amount of data transferred by an immediately previous write request. DeKoning thus does not teach or suggest transmitting a new write request for a further subset of an amount of an immediately previous write request, if said multiple targets do not satisfy the amount of data to be transferred by said immediately previous write request, as required by the claims. For at least these reasons, and in addition to the reasons presented with regard to independent claims 35 and 44, Applicants respectfully submit that dependent claims 39 and 48 are also not anticipated by DeKoning and are thus also allowable.

V. The New Claims

Applicants have added new claims 119-142. Because these claims include limitations similar to those of the remaining pending claims, Applicants respectfully submit that these new claims are allowable for at least the same reasons already presented above.

CONCLUSION

Applicants respectfully request reconsideration and that a timely Notice of Allowance be issued in this case. Applicants believe that no extensions of time or fees are required, beyond those that may otherwise be provided in documents accompanying this response. Nonetheless,

Application No. 10/661,345
Amendment and Request for Continued Examination dated November 9, 2009
Reply to Final Office Action of July 7, 2009

in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Wong Cabello's Deposit Account No. 50-1922, referencing docket number 112-0126US.

Respectfully submitted,

November 9, 2009

Filed Electronically

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